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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/765,437	01/22/2001	Toshiya Suzuki	001764	9007

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EXAMINER

GUERRERO, MARIA F

ART UNIT PAPER NUMBER

2822

DATE MAILED: 10/21/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/765,437

Applicant(s)

SUZUKI, TOSHIYA

Examiner

Maria Guerrero

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10 July 2002.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-3, 5-25 is/are pending in the application.
- 4a) Of the above claim(s) 7, 14 and 21 is/are withdrawn from consideration.
- 5) ☒ Claim(s) 8-13 and 24 is/are allowed.
- 6) ☒ Claim(s) 1-3, 5, 6 and 15-20 is/are rejected.
- 7) ☒ Claim(s) 22, 23 and 25 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

1. This Office Action is in response to the Amendment filed July 10, 2002.

Claim 4 is canceled.

Claims 1-3 and 5-25 are pending.

Election/Restrictions

2. Claims 7, 14, and 21 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim. Election was made **without** traverse in Paper No. 6.

Applicant's election without traverse of Group II, claims 1-6, 8-13, and 15-20 in Paper No. 6 is acknowledged.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1-2 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Saenger et al. (U.S. 5,633,781).

Saenger et al. teaches forming a first insulating film on a semiconductor substrate formed with semiconductor elements, forming a contact hole through the first insulating film, forming a conductive plug (tungsten), and heating the semiconductor substrate in a nitriding atmosphere to nitride the plug (col. 3, lines 55-67, col. 4, lines 5-55). Saenger

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et al. teaches forming an etch stopper layer on the first insulating film, the etch stopper covering the plug (col. 6, lines 27-50). Saenger et al. teaches forming a silicon nitride layer by CVD (col. 4, lines 1015, 27-29). Saenger et al. discloses forming a second insulating film on the silicon nitride layer, forming an opening through the second insulating film, the opening reaching the surface of the plug, forming a rare metal layer in the opening (Fig. 10-15, col. 6, lines 20-65). Saenger et al. shows forming a lower electrode (rare metal) above a semiconductor substrate formed with semiconductor elements, forming a dielectric film on a surface of the lower electrode by CVD, and forming an upper electrode (col. 4, lines 10-65, col. 5, lines 50-60).

Saenger et al. does not specifically show the etch stop layer having the function of stopping etching the second insulating film. However, Saenger et al. teaches the etch stop layer 52 functions as an etch stop layer when etching vertical portion 16 (Fig. 10-12, col. 6, lines 27-45).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to recognize that the etch stop layer taught by Saenger et al. would function as etch stop layer with relation to the second insulating film in order to protect the plug (col. 6, lines 39-42).

4. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Saenger et al. (U.S. 5,633,781) as applied to claims 1-2, 5 above, and further in view of Foster et al. (U.S. 5,567,243).

Regarding claim 3, Saenger et al. does not specifically show the nitriding process in an atmosphere containing ammonia and being executed at a temperature of 600 ° C to 850 ° C. However, Foster et al. discloses the nitriding process using ammonia and a temperature between 600 ° C and 850 ° C as well known in the art (col. 3, lines 25-26, col. 7, lines 29-30, col. 8, lines 15-20, col. 10, lines 10-17).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Saenger et al.'s process by including the nitriding process at a temperature of 600 ° C to 850 ° C and in an atmosphere containing ammonia in order to reduce cost (Foster et al., col. 3, lines 10-15).

5. Claims 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Saenger et al. (U.S. 5,633,781) as applied to claims 1-2, 5 above, and further in view of Applicant admitted prior art.

Regarding claims 6, Saenger et al. fails to show forming the rare metal layer first through physical vapor deposition and then through CVD using oxygen. However, Applicant admitted prior art shows forming the rare metal layer by sputtering (physical vapor deposition) followed by a CVD process using oxygen (pages 1-3).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to include the formation of the rare metal layer by physical vapor deposition followed by the CVD process as taught Applicant admitted prior art because Saenger et al. is using the same rare metal as show Applicant admitted prior art. The modification would provide a capacitor, which would allow good connection

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between the capacitor and the semiconductor elements in the substrate (col. 2, lines 15-18).

6. Claims 15-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Joo (U.S. 6,342,425).

Joo teaches forming a rare metal layer above a semiconductor substrate formed with semiconductor elements, forming an insulating mask layer (SiO₂) on the rare metal layer, patterning the rare metal layer by using the patterned insulating mask layer (fig. 3B-3C, 4B-4C, col. 3, lines 60-67, col. 4, lines 1-20, col. 5, lines 65-67, col. 6, lines 1-7). Joo teaches forming a silicon oxide film by TEOS based CVD, and annealing the semiconductor substrate in hydrogen-containing gas (the thermal process inherently discloses this step) (col. 4, lines 60-67, col. 5, lines 1-5). In addition, Joo discloses forming a dielectric film on the patterned lower electrode (Fig. 3D, col. 4, lines 20-25).

Joo does not specifically show forming the insulating film covering the patterned insulating mask layer. However, Joo teaches the insulating mask material being used in order to increase selection ratio and minimize a residue (col. 4, lines 12-18).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to recognize that the insulating film would also cover the insulating mask in Joo's process.

Allowabl Subj ct Matter

7. Claims 8-13 and 24 are allowed.

Claims 22, 23, and 25 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: the cited references fail to show or suggest "forming a dielectric film on a surface of the lower electrode being thicker in a region near a boundary between the top surface and each of the side surfaces than the dielectric film in a lower region of the side surfaces".

Response to Arguments

8. Applicant's arguments with respect to claims 1-3, 5-6, 15-20 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

9. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within

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TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Maria Guerrero whose telephone number is 703-305-0162.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amir Zarabian can be reached on 703-308-4905. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 for regular communications and 703-308-7382 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

MG
October 3, 2002



AMIR ZARABIAN
SUPERVISORY PATENT EXAMINER
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